REMARKS

The rejection of Claims 11 and 17 under 35 U.S.C. § 102(b) as anticipated by U.S. 6,080,221 (Moore) is respectfully traversed.

The present invention relates to a composition for a polishing pad and a polishing pad using the same, and this polishing pad can be suitably utilized for polishing the surface of semiconductor wafer and the like.

As described in the specification under "Description of the Related Art" beginning at page 1, second paragraph, recent attention has been paid to a method for polishing which can form a surface having high flatness, known as chemical mechanical polishing (CMP). In CMP, polishing is performed by flowing down a slurry which is an aqueous dispersion in which abrasives are dispersed to the surface of a polishing pad from an upper side while sliding a polishing pad and a side to be polished. For CMP, the prior art has disclosed the use of a polyurethane foam as a polishing pad, and soluble materials dispersed in a number of resins. Further improvement in slurry retaining properties and polishing rate is required. The present invention is directed to that end.

As recited in Claim 11, the present invention is a composition for a polishing pad which comprises a water-insoluble matrix material containing a crosslinked polymer and water-soluble particles dispersed in the water-insoluble matrix material, wherein said water-soluble particles are provided with an outer shell for inhibiting moisture absorption in at least a part of the outermost part.

As recited in Claim 17, the present invention is also a composition for a polishing pad which comprises a water-insoluble matrix material containing a crosslinked polymer and organic water-soluble particles comprising at least one selected from the group consisting of dextrin, cyclodextrin, mannit, lactose, hydroxypropylcellulose, methylcellulose, starch, protein, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylic acid, polyethylene oxide,

water-soluble photosensitive resin, sulfonated polyisoprene and sulfonated polyisoprene copolymer, dispersed in the water-insoluble matrix material.

As described in the specification at page 3, second paragraph, the present invention is the result of studies by the inventors regarding the mechanism by which slurry retaining properties and removal rate are gradually decreased during polishing, and the mechanism in dressing in which a pore is formed (face forming) or updated (face updating) on the surface of the polishing pad with a diamond whetstone and the like. The inventors found that an elongation produced on the surface of the matrix material and thereafter, the surface is deformed plastically, thus choking a pore, and further, dusts of not only the surface of a wafer to be polished but also the matrix material itself are produced, which also choke a pore. The inventors thus discovered that the use of a material having a cross-linking structure and manifesting elastic recovery in a matrix material successfully addresses these problems. Indeed, the importance of using a matrix material containing a crosslinked polymer is shown in the comparative data of record, wherein Examples 1 and 2 are according to the present invention, and Comparative Examples 1 and 2, which employ a non-crosslinked polymer, are for purposes of comparison. The polishing assessment of polishing performance for the Examples and Comparative Examples is described in the specification beginning at the paragraph bridging pages 26 and 27. The results are shown in Table 1 at page 28, reproduced below:

Table 1

	Example		Comparative Example	
	1	2	1	2
Removal rate (μm/min.)	190	250	60	10
State of a pore	O	O	X	X
Breaking elongation (%)	100	100	>600	>600
Breaking remaining elongation (%)	0	0	510	220

Applicants describe the results in the specification at page 29, line 1 through the end of page 30, as follows:

> In order to measure the breaking remaining elongation of matrix materials used in Examples 1 and 2 and Comparative Examples 1 and 2, materials from which a water-soluble particle is omitted from respective Examples 1 and 2 and Comparative Examples 1 and 2 were kneaded and molded similarly to make sheets. The sheets were cut into the dumbbell No. 3 test piece shape shown in JIS K 6251 to obtain test pieces.
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> These respective test pieces were stretched to break at a distance between marked lines of 20 mm, a stretching rate of 500 mm/min. and a test temperature of 80°C according to JIS K 6251, and the breaking remaining elongation was calculated based on the aforementioned standard. In a test piece which did not break even when stretched to a maximum 600%, the piece was forced to cut at this elongation of 600%, and the breaking remaining elongation was calculated. These breaking remaining elongation are also shown in Table 1.
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> From the results of Table 1, in Examples 1 and 2 in which a matrix material is a crosslinked polymer, a pore is formed in the better state even after dressing. The breaking remaining elongation of matrix materials used in these polishing pads were all 0%, and it can be seen that no elongation after breaking is perceived. It can be seen that the removal rate is as high as 190 to 250 μm/min. in such the polishing pad.
>
> To the contrary, in Comparative Example 1, a non-crosslinked thermoplastic resin was used as a matrix material. It can be seen that this non-crosslinked thermoplastic resin has the very large breaking remaining elongation of 510% and, therefore, ductility. In addition, a part of pore was choked by dressing. Therefore, the removal rate is 60 μm/min. being 32% of that in Example 1 and 24% of that in Example 2. On the other hand, in Comparative Example 2, since a matrix material used in Examples 1 and 2 is used as a non-crosslinked material, the sample has not the elastic recovery. For this reason, the breaking remaining elongation is as large as 220%. In addition, a part of pore was choked by dressing.

Therefore, the removal rate is 10 μm/min., being 5% of that of Example 1 and 4% of that of Example 2.

Moore discloses a method of coating fertilizer particles having porous surfaces with a water insoluble fluid resin that coats the surfaces, and then hardening the fluid resin to form a solid resin tenaciously bonded onto, and into, the porous surfaces, wherein the fertilizer material may be, *inter alia*, water-soluble or slow releasing (Abstract). In effect, when the fertilizer particle of Moore is water-soluble, it perhaps can be characterized as a water-soluble porous matrix having the surfaces of the pores coated with a solidified, water insoluble resin. Thus, Moore's product is different from, and not suggestive of, the presently-recited composition, regardless of the statement of intended use in the present claims. Moore neither discloses nor suggests a composition comprising a water-insoluble matrix material containing a crosslinked polymer and water-soluble particles dispersed in the water-insoluble matrix material, wherein said water-soluble particles are provided with an outer shell for inhibiting moisture absorption in at least a part of the outermost part. In addition, there is no disclosed requirement in Moore that their water insoluble fluid resins be **crosslinked** upon hardening. Nor is there any disclosure or suggestion in Moore of particles **dispersed** in any type of matrix material.

In addition, with respect to new Claims 33 and 34, the particle size in Moore, based on the examples therein of passing through an 8 mesh or 4 mesh Tyler screen, is relatively large compared to the sizes recited herein and indeed, one skilled in the art would not have considered using the relatively large particles of Moore for a polishing function.

For all the above reasons, it is respectfully requested that the rejection over Moore be withdrawn.

The rejection of Claim 24 under 35 U.S.C. § 103(a) as unpatentable over Moore in view of U.S. 6,245,861 (Class), is respectfully traversed.

Since Moore is now used under 35 U.S.C. § 103(a), the issue of analogous art arises. Moore is non-analogous art.

Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Clay*, 966 F.2d 656, 658, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992) (copy of record). See also MPEP 2141.01(a). Moore fails on both scores, since it is not from the same field of endeavor, and is not reasonably pertinent to the particular problem with which the inventor is involved.

The Examiner relies on Class as disclosing peroxide curing agents. Class discloses high vinyl styrene-butadiene rubber cured through the use of organic peroxides (column 1, lines 14-18). Class is concerned with crosslinked rubber compositions, useful in making final articles such as hoses, belts, parts and particularly tires (column 1, lines 60-62).

Class is also non-analogous art, since it does not satisfy the *Clay* criteria discussed above.

Nor is it clear why one skilled in the art would combine Moore, who is concerned with porous fertilizer particles whose porous surfaces are coated with a hardened solid resin, with Class, drawn to crosslinked rubber compositions intended for use in hoses, belts and tires. Moreover, even if one skilled in the art did combine Moore and Class, the result would still not be the presently-claimed invention, since neither reference discloses or suggests the basic structure as recited in Claims 11 or 17.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

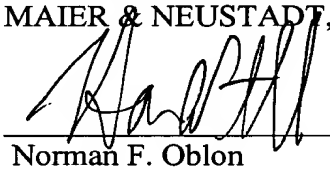
The rejection of Claim 12 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. The Examiner states that he has maintained the rejection, and refers to "item 4,

paper 4." In item 4, paper 4 (Office Action dated June 7, 2002), the Examiner found that the term "said water-soluble particle is an organic water-soluble and an inorganic water-soluble particle" is indefinite. However, that term did not appear in Claim 12, prior to the above amendment, nor does it now appear in Claim 12. Accordingly, it is respectfully requested that this rejection be withdrawn.

Applicants gratefully acknowledge the Examiner's allowance of Claims 12, 13, 18-23 and 25-32. Nevertheless, Applicants respectfully submit that all of the presently pending and active claims are in immediate condition for allowance. The Examiner is respectfully requested to withdraw the restriction requirement, and in the absence of further ground of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Norman F. Oblon
Attorney of Record
Registration No. 24,618

Harris A. Pitlick
Registration No. 38,779

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
NFO/HAP/cja